Attitudes to carbon taxes across Europe: The role of perceived uncertainty and self-interest*

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Abstract

Climate change policy is a challenging field for many governments committed to the national goals stipulated under the 2015 Paris Agreement. Policies that can be effective often prove too unpopular among the public to put in practice. Does the choice of policy instrument—i.e. taxes versus subsidies—relate to this problem, and if so, how? We tackle these questions with data from a cross-national survey in 23 countries. The results point to a widespread aversion to carbon taxes, especially so relative to subsidies promoting renewable energies. This aversion decreases with individual political trust and efficacy—factors that help ease the policy uncertainty surrounding carbon taxes. Yet it worsens with the perceived individual costs of taxes, especially among consumers who depend highly on energy or live in rural areas. Our estimations suggest that the effect of changes in these factors alone would be large enough to reverse public resistance to carbon taxes in some countries.

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1 Introduction

The cornerstone of most governments' climate change policies are energy-related policies. These policies range from voluntary measures to emission-trading or carbon taxes. Taken together, countries strive to enact policy instruments to de-carbonise their societies. Such legislative activities targeting a change from a mainly fossil fuel based to a (largely) carbon-neutral economy are usually subsumed as energy transition policies. Two of the most important policy instruments at any government's disposal to promote energy transition are carbon taxes and subsidies on renewable energy generation. While the former discourages the use of fossil fuels, the latter incentivises energy production from renewable sources.

Carbon taxes are an obvious instrument for any government looking to reduce climate change. By increasing the cost of activities detrimental to the environment, taxes lead to changes in the behaviour of masses for the better—towards innovative and greener alternatives that reduce pollution (Aldy & Stavins, 2012). An example is the tax on carbon in Australia; after its introduction in 2012, the country saw an over 8% decrease in emissions in a short period of time (O'Gorman & Jotzo, 2014). Moreover, the revenues raised from these taxes offer further opportunities for governments, such as the ability to finance specific environmental purposes (Kallbekken & Aasen, 2010) or to reduce other taxes for a stronger and fairer economy (Ballard & Medema, 1993). Taxes, as a result, loom large as an important option for climate change policy (Goulder & Parry, 2008).

Yet they are not a popular option—at least, not as much as their effectiveness would suggest. For example, carbon taxes are implemented currently in as few as 22 countries

worldwide (World Bank, 2018). Many see the public resistance to taxes as the main reason behind the reluctance of governments to use this policy instrument (Carattini, Carvalho, & Fankhauser, 2018),[1] pointing to the numerous occasions where carbon tax proposals were rejected in popular votes.[2] Indeed, Australia's effective policy was abolished after two years as well, following an election dubbed 'a referendum on the carbon tax' (Rootes, 2014). As a result, governments committed to the environment face a dilemma between effectiveness and popularity in climate change policy, and—as public opinion shapes policy (Shapiro, 2011)—the benefits of carbon taxes might remain outweighed in the near future.

Understanding the resistance to carbon taxes could offer other ways out of this dilemma, and there is an urgency to know the determinants of individual attitudes in this area. This has led to a burgeoning literature on public attitudes to climate change policy in the last decade or so,[3] but the existing evidence mostly comes from a limited number of cases—be it of policies or countries. Our contribution moves beyond the existing knowledge in important ways. First, with data from the European Social Survey (ESS, 2016) on individual attitudes to carbon taxes *and* subsidies, we are able to isolate the effect of the instrument choice—that is, taxes versus subsidies—on people's attitude to energy-related climate change policies. Little is known whether and how much of the resistance to these policies relate directly to policy instruments. Indeed, Cherry, Kall-

[1]Negative attitudes are also common among the industry (Clinch & Dunne, 2006; Dresner, Jackson, & Gilbert, 2006; Klok, Larsen, Dahl, & Hansen, 2006), which contributes to the resistance to carbon taxes (Farrell, 2016).

[2]For example, in two separate referenda in Switzerland—first in 2000 (Thalmann, 2004) and then again in 2015 (Carattini, Baranzini, Thalmann, Varone, & Vöhringer, 2017).

[3]For recent reviews of this literature, see Drews and Van den Bergh (2016) and Carattini, Carvalho, and Fankhauser (2018).

bekken, and Kroll (2012, 2014) show that much of the public resistance is against the market intervention in general, and not necessarily against taxes per se. Evidence from the decades-long history of the environment-related referenda in Switzerland supports their claim, as the proposals with carbon taxes have not been more likely to be rejected than the proposals with other instruments (Halbheer, Niggli, & Schmutzler, 2006).

Second, this article provides evidence from 23 countries, most of which are yet to feature in the literature. In fact, the existing knowledge originates largely from studies that do not seek nationally representative samples—such as interviews, focus groups, and experiments—while representative evidence comes from case-studies of a handful of countries.[4] Therefore, we heed the call (Fairbrother, 2017, p. 6), and contribute to this influential literature with evidence from different countries as well as from more than one policy instrument.

We argue that individuals' preferences concerning energy-related climate change policy instruments emanate from (a) the specific characteristic of the policy instrument (policy uncertainty), as well as (b) from an individual's self-interest. We argue that especially in the context of carbon taxes, uncertainty about the effectiveness and revenue usage of carbon taxes leads individuals to be less supportive, however, that political trust and efficacy can ameliorate this aversion. With respect to an individual's self-interest, we submit that energy conservation potential as well as the place of dwelling determine whether individuals have a more positive view of carbon taxes.

[4]These countries are, most notably, Norway (Kallbekken & Sælen, 2011), Sweden (Jagers & Hammar, 2009; Hammar & Jagers, 2006), Switzerland (Carattini et al., 2017; Halbheer et al., 2006; Thalmann, 2004), the UK (Gaunt, Rye, & Allen, 2007), and the US (Kotchen, Turk, & Leiserowitz, 2017; Dietz, Dan, & Shwom, 2007).

We test these theoretical propositions on survey data from the latest wave of the European Social Survey (ESS, 2016). The main results are three-fold. First, our large-n evidence from European countries does support findings from single country case studies, namely that there is indeed widespread aversion to carbon taxes, especially so relative to subsidies. If governments were to introduce new taxes, as things stand they will face public resistance almost everywhere. Nevertheless, there is interesting variation regarding the unpopularity of taxes between individuals and countries. In explaining this individual variation, we, secondly, find the support for taxes improves significantly with individuals' levels of political trust and efficacy—more so than the individual support for subsidies. Third, however, we find support for taxes relative to subsidies is lowest among people who depend highly on energy or live in rural areas. These results hint to the importance of perceived policy uncertainty and individual self-interest in determining the (relative) support for carbon taxes as instruments in climate change policy. Substantively, their potential effects on the public attitudes toward carbon taxes are large enough to be decisive at least in some countries.

The remainder of the article proceeds as follows. The following section reviews the related literature, showing that concerns for the environmental and economic consequences of taxes drive the public resistance to taxes. Section 2 then details five hypotheses based on a rational-choice perspective. We briefly introduce the data, main variables, and the methods in Section 3, leaving the details to Supporting Information S1. The subsequent section presents the descriptive analysis and multivariate tests of the hypotheses. Finally, the paper concludes with remarks on the political relevance of our results.

2 Literature Review

There is a growing interest—scholarly or otherwise—on the public attitudes to energy-related climate change policies, which reflects the importance of social acceptance for these policies to be successfully implemented. However, what we already know points to a challenge for decision makers looking to implement the most effective policy alternative: against the overwhelming evidence of their effectiveness (Weitzman, 2017; Baranzini & Carattini, 2017; Aldy & Stavins, 2012; Mankiw, 2009; Metcalf, 2009; Goulder & Parry, 2008; Ballard & Medema, 1993; Baumol & Oates, 1971), the public support for carbon taxes remains low in absolute terms (Carattini et al., 2017; Jagers & Hammar, 2009; Dietz et al., 2007) and relative to other—albeit less efficient—instruments such as subsidies (Heres, Kallbekken, & Galarraga, 2017; Cherry et al., 2012; De Groot & Schuitema, 2012; Kallbekken & Aasen, 2010; Steg, Dreijerink, & Abrahamse, 2006).[5] Studies on the causes of this resistance suggest that environmental and economic consequences of taxes, as perceived by the people, are to blame.

To begin with, people do not seem to agree with the scientific evidence that taxes can be a solution to environmental problems. In part, this is a question of effectiveness, and many believe that increasing the cost of polluting would be ineffective to address the problems at hand (Baranzini & Carattini, 2017; Carattini et al., 2017; Kallbekken & Aasen, 2010; Gaunt et al., 2007; Clinch & Dunne, 2006; Dresner et al., 2006; Steg et al., 2006). Interviews and focus groups show that participants expect people would 'pay to

[5]The evidence from the research on environmental *regulations* is less clear. While some (Clinch & Dunne, 2006; Deroubaix & François, 2006) find that the level of support for taxes is lower than the level of support for regulations as well, others (Cherry et al., 2012; Halbheer et al., 2006) report the opposite finding.

pollute' even if governments introduce or increase carbon taxes (Kallbekken & Aasen, 2010; Gaunt et al., 2007; Clinch & Dunne, 2006)—in other words, there is a widespread belief that the price elasticity of polluting activities is too low for taxes to change the behaviour of consumers. However, the level of support for carbon taxes increases if people experience—for example, in trials (Carattini, Baranzini, & Lalive, 2018; Tiezzi & Xiao, 2016; Cherry et al., 2014; Schuitema, Steg, & Forward, 2010)—or simply believe (Hammar & Jagers, 2006) that these taxes work.

In part, it is a question of trust. Increasing the cost of polluting may well be an effective deterrent, but people are then suspicious that this is why governments are keen to introduce carbon taxes (Clinch & Dunne, 2006; Hammar & Jagers, 2006). Instead, people worry that governments use environmental problems 'as a cover for obtaining new revenues' (Klok et al., 2006, p. 913), which may not be spent for the environment or redistributed back to the people (Hsu, Walters, & Purgas, 2008; Clinch & Dunne, 2006; Dresner et al., 2006). Putting the two parts together, in short, there is uncertainty about whether taxes could or would possibly be used to actually address the environmental problems they are associated with. This is why, as many studies show, earmarking helps: if governments designate the revenues, the level of support for taxes increases significantly as this practice provides some certainty that taxes can and will be used to address certain environmental problems (Baranzini & Carattini, 2017; Carattini et al., 2017; Gevrek & Uyduranoglu, 2015; Kallbekken & Aasen, 2010; Deroubaix & François, 2006; Dresner et al., 2006; Steg et al., 2006).

Another group of reasons behind the public resistance relates to the perceived economic consequences of taxes. First and foremost, people are worried that carbon taxes

will increase their personal costs (Brännlund & Persson, 2012; Jagers & Hammar, 2009; Clinch & Dunne, 2006). Studies repeatedly show that, for example, the opposition to taxes is significantly higher among car owners (Hsu et al., 2008; Gaunt et al., 2007; Hammar & Jagers, 2006; Thalmann, 2004), who are more likely to see their costs increase as a result of common carbon taxes, such as the ones on fuel or congestion. Similarly, there is a negative relationship between tax rates and public support (Baranzini & Carattini, 2017; Gevrek & Uyduranoglu, 2015; Cherry et al., 2012; Kallbekken & Sælen, 2011; Thalmann, 2004) as people prefer taxes that would cost them as little as possible. However, people seem to overestimate the personal costs associated with carbon taxes (Schuitema et al., 2010)—unlike the environmental benefits of these taxes which, as discussed above, are often underestimated.

Moreover, a distinct feature of policy instruments that impacts on public acceptance is the (non-)coercive character of the policy. Taxes— known as 'push' measures—are considered less acceptable due to their coercive character when compared to 'pull' measures such as subsidies. Geller (2002) finds that positive attitudes are more likely in the context of pull measures because this approach is more voluntary, a result also found by De Groot and Schuitema (2012). Thus, besides policy uncertainty or self-interest, a relative preference for another instrument that is less coercive might determine an individual's preference.

3 Theory and Hypotheses

We view the attitudes to energy-related climate change policies from a rational-choice perspective, where individuals support policy instruments that are likely to minimise their costs and/or maximise their benefits (Stern, Dietz, & Kalof, 1993). Besides their self-interest, we argue that policy instrument characteristics, especially the uncertainty surrounding the policy instrument are decisive in determining an individual's absolute and relative support of a policy. We therefore argue that policy uncertainty and self-interest are key determinants of individual support for energy-related climate change policies.

With respect to taxes, the implication on the individual material self-interest are relatively easy to discern for the individual (Kallbekken & Aasen, 2010), although individuals often overestimate their personal costs (Schuitema et al., 2010). An individual's consumptive behaviour, as well as her potential to adapt costly behaviour (i.e. become more energy efficient) are important to determine the impact of a carbon tax on the individual and thus the individual's evaluation of the policy. Concerning policy uncertainty, the literature above makes it clear that there is a lot of perceived uncertainty beyond individuals about (a) whether carbon taxes could solve the problem they address and (b) how these taxes would be used (i.e. whether they are earmarked to ameliorate the specific problem).

Concerning subsidies on renewable energy (as an alternative policy instrument within this realm), the reverse holds true. On the one hand, as subsidies are usually not impacting all individuals directly, it is harder for each individual to grasp the (indirect) impact

the policy instrument (i.e. subsidizing renewable energy) has on tangible personal costs such as a higher energy price (Jagers & Hammar, 2009) . Beneficiaries of subsidies certainly know that they personally profit, however, for others the subsidies' impact on their material self-interest stays vague.

On the other hand, policy uncertainty is somehow less pronounced in the case of subsides. First, the more voluntary character of the instrument has been found to lead to a high acceptance (De Groot & Schuitema, 2012). Second, studies such as Steg et al. (2006) show that people overestimate the effectiveness of subsidies, while underestimating the effectiveness of taxes. Indeed, Heres et al. (2017) find that although uncertainty hinders the level of support for both instruments, the adverse effect is larger for taxes. In fact, the ambiguity about who is paying for subsidies might actually boost the relative support for this instrument—an effect that disappears as soon as people learn that the environmental subsidies will cost them personally too (Stadelmann-Steffen & Dermont, 2018).

Taken together, we propose that the lower policy uncertainty (higher level of perceived effectiveness and the less coercive character of the policy) surrounding subsidies as well as the unclear impact on material self-interest lead to higher levels of support for subsidies relative to taxes. Consistent with existing research, we thus expect the public support to be lower for taxes than for subsidies.

Hypothesis 1: *The level of public support for taxes is lower than the level of public support for subsidies.*

Against this backdrop, the following subsections develop two further sets of hypotheses based on factors that (1) decrease policy uncertainty around carbon taxes and that (2) make the cost of taxes clearer for consumers. We will then test these hypotheses on the bases of both the absolute support for taxes and the support relative to subsidies.

3.1 Political trust and efficacy

A first set of theoretical expectations is related to the policy uncertainty around carbon taxes. As reviewed above, there is mounting evidence that people are uncertain about whether taxes as a policy instrument could or would be used to address environmental problems, and that this uncertainty lowers the support for taxes. If these are true, factors that help decrease this uncertainty should at the same time contribute to a higher individual support. In fact, more certainty about the workings of a policy instrument likely improves the acceptance of any instrument, but as a result of the direct and coercive nature of taxes (Heres et al., 2017; Steg et al., 2006), we expect the improvement to be particularly prevalent for taxes. In this article, we consider two such factors at the individual level—political trust and efficacy.

Political trust is a crucial element of social capital for governments as 'institutional trust will matter for the support or rejection of *any* government activity' (Paxton & Knack, 2012, p. 174). Consequently, it has become a concept that features often in studies over public attitudes—including environmental attitudes (Fairbrother, 2017), which are associated with political trust in a large body of research (Baranzini & Carattini, 2017; Dietz et al., 2007; Gaunt et al., 2007; Beuermann & Santarius, 2006; Hammar & Jagers, 2006). When a government proposes to address as complex an issue as climate change

with taxes, those who have higher levels of political trust should be more likely to believe that the government proposal could and would work. Their policy uncertainty should thus be lower, and as a consequence, their support for taxes higher. This is why we expect political trust (a) to correlate positively with the absolute level of support for carbon taxes and (b) to help narrow the gap between the level of support for taxes and subsidies.

> **Hypothesis 2:** *The level of support for carbon taxes is higher among people with high political trust.*

What is yet to establish itself in the literature on the acceptability of climate change policies is political efficacy—specifically, *external* political efficacy, which refers to beliefs about government responsiveness to citizen demands (Craig, Niemi, & Silver, 1990). Irrespective of the political trust put in governments, their climate change policy might turn out to be a failure in the eyes of the citizens. Under high external efficacy—i.e. where people (are perceived to) have a say in what their governments do—the citizens can at least then expect these policies to be reformed or dropped altogether in line with their demands (Soroka & Wlezien, 2005; Wlezien, 1995). However, where governments are not responsive to citizen demands, policies are more likely to remain untouched once enacted even if they prove to be unpopular. Hence we hypothesise the absolute and relative support for carbon taxes to increase with external efficacy.

> **Hypothesis 3:** *The level of support for carbon taxes is higher among people with high external political efficacy.*

3.2 Self-interest

A second set of expectations is related to the personal cost of carbon taxes. As already suggested above, one of the main reasons behind the public resistance to carbon taxes is their perceived economic consequences. In the context of taxes, these economic consequences are directly visible to people. Thus, the resistance against this policy instrument should be stronger among people who are more likely to pay more. Here we develop hypotheses based on two such groups: those who depend on energy and those who live in rural areas.

As carbon taxes often aim at limiting energy consumption behaviour, heavy consumers of energy share a higher burden of these taxes—a principle that has widespread support among the public (Jagers & Hammar, 2009; Hammar & Jagers, 2006)—unless they reduce their consumption levels. However, the elasticity of energy consumption is not the same for everyone, and consumers are more likely to lose if they cannot use less energy despite a new or increased carbon tax. Therefore, we expect to find a negative relationship between energy dependency of individuals and their support for taxes.

> **Hypothesis 4:** *The level of support for carbon taxes is lower among people with high energy dependency.*

One special case of energy dependency emerges in rural areas, where people rely more heavily on energy for mobility (due to relative lack of public transport amid larger distances) and heating (due to characteristically less energy-efficient housing) than people living in urban areas (Kallbekken & Sælen, 2011; Broz & Maliniak, 2010; Ewing & Rong, 2008). As a result, carbon taxes are likely to have more repercussions on rural areas. This

effect is not limited to those rural habitants who personally depend on energy. If carbon taxes mean less money (and eventually fewer people) to remain in the local economy, all residents would have to shoulder the burden of these taxes disproportionately. This leads us to hypothesise the support for carbon taxes to be lower in rural than in urban areas.

> **Hypothesis 5:** *The level of support for carbon taxes is lower among people living in rural areas.*

4 Data and Design

Our analysis draws on data from the European Social Survey (ESS). Including for the first time a module on energy and climate change, Round 8 of the ESS (2016) provides a unique opportunity to test the empirical implications of the arguments made above across 23 countries (n = 44,387). The majority of these countries are in the European Union (EU) or the European Free Trade Association (EFTA)—Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom—while the survey includes also Israel and the Russian Federation. This allows us to provide cross-national evidence for absolute and relative individual preferences for energy-related climate change policies in a range of countries larger than it has ever been possible before.

We are particularly interested in the preferences for two of the most important market instruments in these policies. The ESS respondents were asked about their support for different instruments to reduce climate change separately, for (1) 'increasing taxes on fossil

fuels, such as oil, gas and coal' and (2) 'using public money to subsidise renewable energy such as wind and solar power'.[6] The answers to these consecutive questions provide the data for our first two dependent variables, *Taxes* and *Subsidies*.

However, such survey questions pose a challenge for any attempt to analyse the attitudes to specific policy instruments. Consider, for example, the respondents who report that they are strongly against increasing the taxes on fossil fuels to reduce climate change. It is not clear whether their aversion is to (a) the idea that climate is changing, (b) that the change can be reduced, (c) the *government intervention* to reduce it, (d) the use of *market mechanisms* to do so, or specifically to (e) the *instrument* proposed, i.e. the taxes. This is why, in addition to using the two survey items as separate dependent variables, we also generate a third, index dependent variables as:

$$\begin{aligned} \textit{Taxes–Subsidies} = \textit{Support for increasing taxes on fossil fuels} - \\ \textit{Support for subsidising renewable energy} \end{aligned}$$

which ranges from -4 (strongly against increasing taxes while strongly in favour of introducing subsidies to reduce climate change) to $+4$ (strongly in favour of increasing taxes while strongly against introducing subsidies to reduce climate change). Hence this variable measures the relative preferences, allowing us to isolate the effect of specific instrument type (that is, taxes versus subsidies) on the respondents' preferences for energy-related climate change policies. This dependent variable is more relevant to our analysis

[6] The exact survey question was: 'To what extent are you in favour or against the following policies in [country] to reduce climate change?' The response options were 1 = 'strongly in favour', 2 = 'somewhat in favour', 3 = 'neither in favour nor against', 4 = 'somewhat against', and 5 = 'strongly against'. We have reversed the original scale so that higher values indicate increasing favour.

as we are primarily interested in the extent to which the support for energy-related climate change policies varies by the instrument proposed. Having a relative measure of support increases our confidence that the results we report in this article relate strictly to instrument type.

To provide easily interpretable results, we treat all three dependent variables as continuous in the main body of the article although they are ordinal measures. This allows us to model the data with ordinary least squares (OLS) regressions. In the Supporting Information S4, however, we provide robustness tests on this modelling choice by re-estimating the coefficients in ordered logistic regression models. The results remain substantively the same.

For the independent variables of interest, we use data from the survey questions measuring (a) how much on average the respondents trust their country's parliament, political parties, and politicians (*Political Trust*), (b) how much they believe the political system in their country allows people like them to have a say in what the government does (*Political Efficacy*), (c) how confident they are that they could use less energy than they do now (*Energy Dependence*), and finally (d) how rural is the area they live in (*Rural Areas*).

To show that our substantive results are not driven by inclusion or exclusion of covariates, we report every model twice—with and without control variables.[7] At the individual level, these variables include the respondents' age, gender, left-right orienta-

[7]Note that this also allows us to provide evidence from all 23 countries at least in the models without controls, as the number of countries decrease to 18 with the country-level control variables due to missing data.

tion, climate change worries, and energy cost worries. In addition, GDP, average party position on green energy, whether there is already a carbon tax in place, and renewable energy capacity are country-level controls. For more details on the data and variables, see Supporting Information S1.

5 Results

To begin with our empirical analysis, Figure 1 plots the mean levels of public support for taxes and subsidies to reduce climate change. In each of the 23 countries included in the survey, it shows that the level of support is lower for taxes than for subsidies. Overall, people are rather negative about increasing the taxes, with the average preference (2.72, standard deviation = 1.19) under the neutral mid-point of the scale—'neither in favour nor against'. In fact, the support turns only slightly positive in no more than five cases, which are, with the exception of Switzerland, all Nordic countries. In contrast, the mean levels of support for subsidies are positive in all countries in the survey, with the average person (3.89, standard deviation = 1.06) located close to 'somewhat in favour'. These results confirm the hypothesis that public support for carbon taxes is lower than public support for environmental subsidies.

However, Figure 1 makes it also clear that there is a substantial cross-country variation with regard to relative popularity of the two instruments, represented with the length of the grey lines between the mean points. Here the cases range between Slovenia, where the difference between the means is above 1.8 points over a five-point scale—and Iceland, where this difference is under 0.5 points. In other words, the relative popularity of

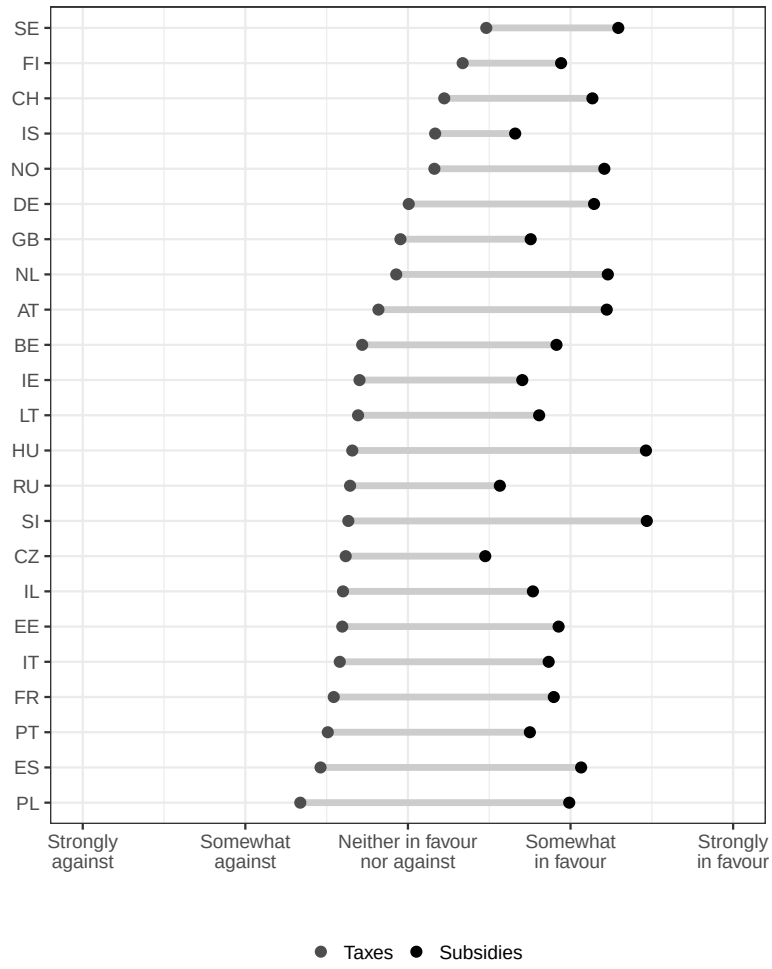

Figure 1: Mean levels of public support for policy options to reduce climate change. *Notes:* The values are based on the ESS Round 8 (ESS, 2016), weighted to account for sampling error, non-response bias, and differences in inclusion probabilities. See Table S2 in the Supporting Information for the underlying values in table format.

these two instruments vary from one country to another, as much as over three-folds by comparison.

Similarly, there is also a substantial variation at the individual level. Figure 2 plots the index dependent variable, the difference between the level of support for increasing taxes for fossil fuels and the level of support for using public money to subsidise renewable energy to reduce climate change. It shows that about 30% of the respondents have the

same attitude towards taxes and subsidies ($x = 0$).[8] Yet, the choice of instrument makes a difference for the majority. Verifying the population averages above, this difference is in favour of subsidies ($x < 0$) in most cases. Having said that, some—albeit relatively small number of—respondents report a higher preference for taxes than for subsidies ($x > 0$).

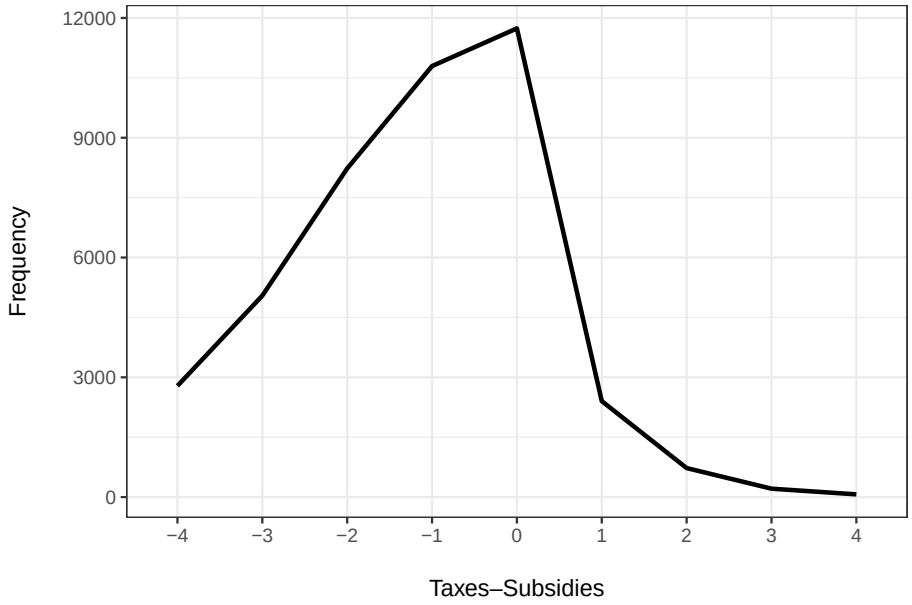

Figure 2: The frequency distribution of the index dependent variable. *Note:* The categories are based on the ESS Round 8 (ESS, 2016), calculated as the unweighted differences between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change.

Therefore, taxes might be less popular than subsidies in all of the 23 countries under analysis, but the descriptive results show that the relative support for these instruments vary between individuals as well as countries, where the preference reverses for some survey respondents. In the remainder of this section, we provide explanations as to the

[8] In essence, this means that we lump together persons who have the same opinion about both instruments. Thus, fierce proponents of a comprehensive climate change policy (liking both subsidies and taxes) and fierce opponents (rejecting any of those instruments) are subsumed here. Our research interest, however, lies in the relative preference for each instrument. Excluding those with no difference in preference between taxes and subsidies does not change our substantive results. See Supporting Information S4.2.

determinants of such variations at the individual level with evidence from multivariate analyses.

5.1 Multivariate results

We start with the statistical models of support for taxes relative to subsidies. Table 1 presents a summary of two multilevel OLS regression models with the index dependent variable, *Taxes–Subsidies*. Figure 3 then complements the main results with predictions stemming from the estimations in the second model, which includes the individual- and country-level control variables.

For the factors related to policy uncertainty, we find statistically significant positive relationships between both *Political Trust* and *Political Efficacy* on the one hand, and the relative preference for taxes on the other. With regard to the former, the substantial effect is about half a point on a nine-point scale of our dependent variable—the relative preference for taxes increases from –1.41 to –0.95 with the respondents' trust in the political institutions and actors in their country. As Figure 3 shows, the effect size is slightly smaller with regard to political efficacy: while the average score for *Taxes–Subsidies* is –1.33 among those who believe that people like them have no say in what their government does, we predict this average to be –1.01 for those who believe the complete opposite—that they have a great deal of say.

For the factors related to self-interest, we again find statistically significant but this time negative relationships, confirming our respective hypotheses. First, the relative support for taxes decreases with the respondents' dependency on energy. According to

Table 1: Explaining the support for taxes relative to subsidies

	Taxes–Subsidies	
	Basic Model	+ Controls
Political Trust	0.05***	0.05***
	(0.00)	(0.00)
Political Efficacy	0.08***	0.08***
	(0.01)	(0.01)
Energy Dependence	–0.02***	–0.01***
	(0.00)	(0.00)
Rural Areas	–0.06***	–0.05***
	(0.01)	(0.01)
Controls	✗	✓
Constant	–1.29***	–1.60***
	(0.07)	(0.28)
N–Observations	40653	28477
N—Groups	23	18
Log likelihood	–70830.21	–49412.92
Wald χ^2	674.21	751.62

Notes: Models include multilevel OLS coefficients, where individuals are nested in countries, with standard errors in parentheses. The dependent variable is the difference between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change. Individual-level controls include age, gender, left-right orientation, climate change worries, and energy cost worries. Country-level controls include GDP, average party position on green energy, whether the countries have carbon taxes, and their renewable energy capacity. See the Supporting Information for more on the data and variables, the descriptive statistics (Table S1), and for the complete table (Table S3). *** $p < 0.001$.

Figure 3, the average predicted support for taxes relative to subsidies is –1.17 among the respondents who are completely confident that they could use less energy than today, but this decreases to –1.31 among those at the other end of the spectrum. There is a

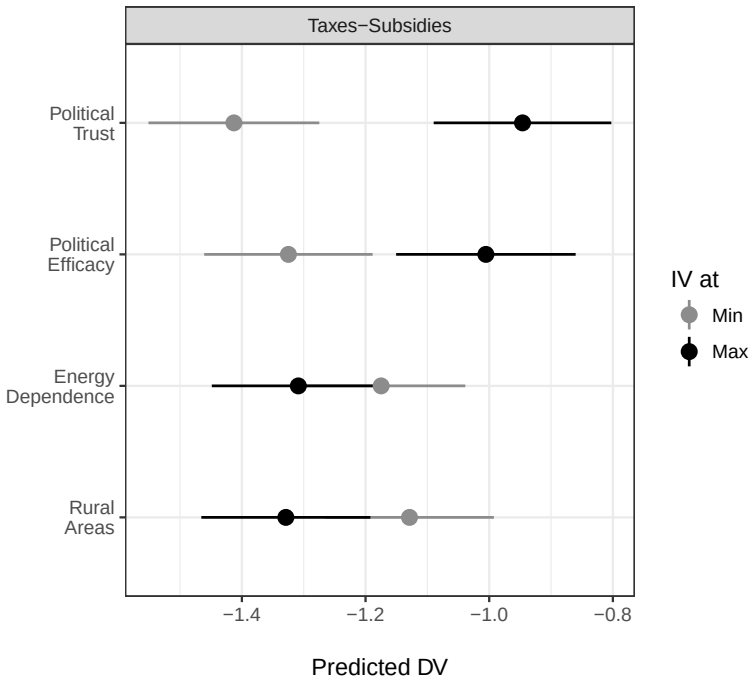

Figure 3: Predicted support for taxes relative to subsidies. *Notes*: Predictions are based the model with controls in Table 1. The dependent variable is the difference between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change. Horizontal bars represent 95% confidence intervals. Other variables are set to observed values.

likewise decrease in support on the urban-rural divide. Here the effect is slightly larger in comparison—about one-fifth of a point on a nine-point scale—where the relative support for taxes over subsidies decreases significantly as the area that the respondents live in become more rural.

We next turn to the determinants of support for the policy instruments separately, as summarised in Table 2 and visualised in Figure 4. Overall, the results are similar to the ones reported above, especially with regard to *Taxes* as the dependent variable. To begin with *Political Trust*, this variable correlates positively with both *Taxes* and *Subsidies* across the models with and without controls. Substantively, however, the size of its effect is more than three times larger for taxes than for subsidies. For *Political Efficacy*, we find significant correlations with the support for taxes but not for subsidies. Average support

for increasing carbon taxes is 2.68 among those who believe that people like them have no say in what their government does, and this increases to 3.00—the midpoint in the scale—among those who believe they have 'a great deal' of say. In comparison, these two groups of people have virtually the same average support for subsidies in the model with controls, and the related estimations overlap in Figure 4.

Table 2: Explaining the support for taxes and subsidies—summary results

	Taxes		Subsidies	
	Basic Model	+ Controls	Basic Model	+ Controls
Political Trust	0.07***	0.07***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Political Efficacy	0.11***	0.08***	0.03***	–0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Energy Dependence	–0.05***	–0.03***	–0.03***	–0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Rural Areas	–0.07***	–0.05***	–0.01**	0.00
	(0.00)	(0.01)	(0.00)	(0.00)
Controls	✗	✓	✗	✓
Constant	2.67***	2.07***	3.96***	3.65***
	(0.05)	(0.16)	(0.06)	(0.21)
N—Observations	40972	28616	41450	28846
N—Groups	23	18	23	18
Log likelihood	–64732.78	–44316.21	–60158.23	–40718.30
Wald χ^2	2121.56	3357.98	364.89	1601.01

Notes: Models include multilevel OLS coefficients, where individuals are nested in countries, with standard errors in parentheses. The dependent variables are the support for increasing taxes on fossil fuels (first two columns) or for subsidising renewable energy (last two columns) to reduce climate change. Individual-level controls include age, gender, left-right orientation, climate change worries, and energy cost worries. Country-level controls include GDP, average party position on green energy, whether the countries have carbon taxes (first two columns), and their renewable energy capacity (last two columns). See the Supporting Information for more on the data and variables, the descriptive statistics (Table S1), and for the complete table (Table S4). ** $p < 0.01$, *** $p < 0.001$.

Energy Dependence has statistically significant, negative relationships with both *Taxes* and *Subsidies* while the substantive effects differ with policy instruments. All else being

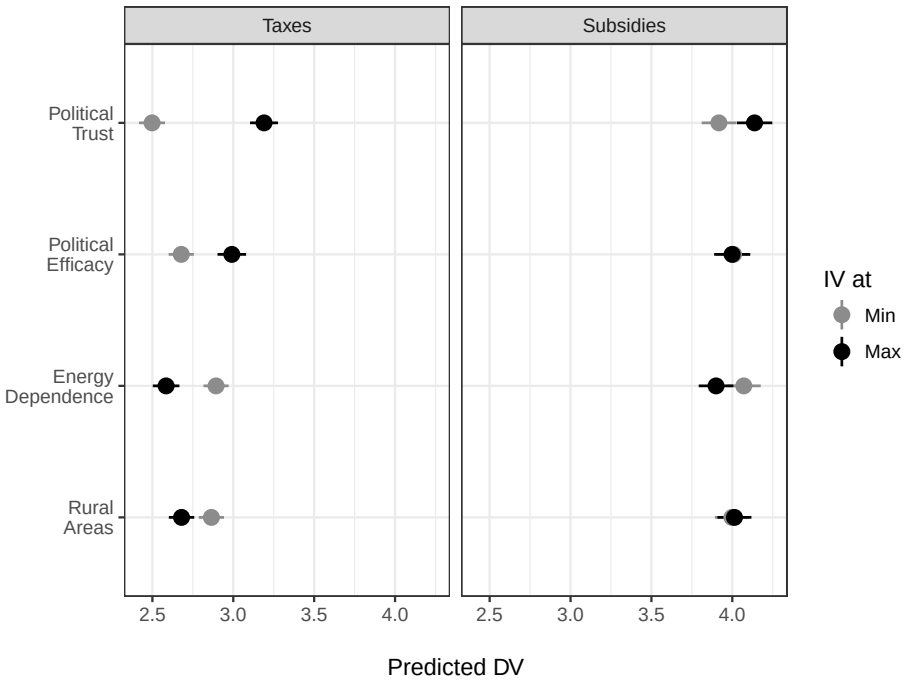

Figure 4: Predicted support for taxes relative to subsidies. *Notes*: Predictions are based on the model with controls in Table 2. The dependent variables are the respondents' support for *increasing taxes for fossil fuels* (on the left) and *subsidising renewable energy* (on the right) to reduce climate change. Horizontal bars represent 95% confidence intervals. Other variables are set to observed values.

equal, a switch from maximum to minimum confidence that the respondents could use less energy is associated with a 0.31 decrease on a five-point support scale for carbon taxes. This is about twice the size of the effect on *Subsidies*. Figure 4 shows that the substantial differences are starker for *Rural Areas* as the estimates for the effect of living in big cities and rural dwellings on the support for environmental subsidies coincide almost perfectly. Indeed, in the model with the control variables, we find no statistically significant relationship between *Rural Areas* and *Subsidies*. In contrast, the statistically significant, negative relationship between *Rural Areas* and *Taxes* hold with or without the controls.

6 Conclusion

In search for policy instruments to reduce climate change, many governments face a dilemma between environmental effectiveness and popularity. One would think carbon taxes are the *go-to* instrument since they are known for their effectiveness in changing behaviour in favour of the environment. What is more, these taxes also generate additional revenues for governments to improve the lives of their citizens—environmentally or otherwise. Yet they are unpopular with the public. This article extends the empirical evidence on their absolute and relative unpopularity with representative data from more than two dozen countries, most of which are to appear in the literature with this article. We find that there is no overall support for increasing taxes on fossil fuels in most countries, and relatively less than the support for subsidies for renewable energy in all 23 countries in the dataset.

Multivariate analyses provide insights into the reasons behind the unpopularity of carbon taxes. On the one hand, the results show that the attitudes towards taxes improve significantly with higher political trust and efficacy. Indeed, these factors might correlate positively with the level of support for any government policy, but we find that the effects are significantly higher for taxes than for subsidies. We argue that this is because the level of support for taxes are particularly prone to uncertainty, which decreases with trust and efficacy. On the other hand, the level of support for carbon taxes is significantly lower among people who depend highly on energy or live in rural areas, for whom the economic cost of energy-based taxes is likely to be higher. We see this as evidence that individual self-interest is one of the determining factors behind the attitudes towards carbon taxes.

These results can be considered as good as well as bad news for the future of carbon taxes. These are bad news because, as things stand, people are on average against carbon taxes in many countries. Governments looking into introducing taxes into their climate change policy portfolio any time soon will likely meet public resistance. However, our results can also be considered as good news at least in countries where the average support for taxes is only slightly negative. If the governments in these countries take steps to decrease the policy uncertainty around taxes, they can shift the attitudes towards a positive evaluation, which then is also good news for the climate. This article shows that increasing political trust and efficacy of the citizens could be a step in this direction.

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SUPPORTING INFORMATION

'Attitudes to carbon taxes across Europe: The role of perceived uncertainty and self-interest'

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Contents

S1 Codebook of Variables

As explained in the main text, our main data source is the European Social Survey (ESS), and except for the country-level controls, all our variables originate from the Round 8 of this survey (ESS, 2016). The ESS is an academically driven project based on face-to-face interviews with cross-sectional samples. It is conducted every two years since 2002, with rotating sections complementing the core survey in different rounds. In Round 8, one of these rotating sections was for the first time a module on public perceptions of climate change and energy security.

Table S1: Descriptive statistics.

	N	Mean	Median	SD	Min	Max
Dependent variables						
Taxes	42401	2.77	3	1.23	1	5
Subsidies	42983	3.94	4	1.07	1	5
Taxes–Subsidies	42007	–1.16	–1	1.43	–4	4
Key independent variables						
Political Trust	44051	3.96	4	2.27	0	10
Political Efficacy	43429	2.20	2	0.94	1	5
Energy Dependence	43435	3.96	4	2.63	0	10
Rural Areas	44337	2.87	3	1.24	1	5
Individual-level controls						
Age	44232	49.14	49	18.61	15	100
Education	44170	4.01	4	1.85	1	7
Female	44378	0.53	1	0.50	0	1
Household Income	44387	18.78	6	29.32	1	99
Left-Right Orientation	38583	5.16	5	2.24	0	10
Climate Worries	42654	3.01	3	0.93	1	5
Cost Worries	43955	3.10	3	1.04	1	5
Country-level controls						
GDP	44387	42118.16	41364.44	12509.37	24855.08	72485.04
Party Position	35450	0.21	0.31	0.28	–0.35	0.60
Carbon Tax	44387	0.51	1	0.50	0	1
Renewable Capacity	44387	24034.81	7930	28150.49	619	105839

Table S1 provides the descriptive statistics for all variables used in the analysis before we proceed to define each of them in detail below.

S1.1 Dependent variables

The three dependent variables come from a battery of questions measuring how much the respondents are in favour or against different instruments to reduce climate change:

Taxes. Increasing taxes on fossil fuels, such as oil, gas and coal.

Subsidies. Using public money to subsidise renewable energy such as wind and solar power.

The answers are (reverse) coded as 5 = 'strongly in favour', 4 = 'somewhat in favour', 3 = 'neither in favour nor against', 2 = 'somewhat against', and 1 = 'strongly against' to code the first two dependent variables above. In addition, we created a third, index dependent variable out of two items.

Taxes–Subsidies. We calculated this depended variable as the difference between respondents' support for taxes and subsidies. Figure 2 in the main text shows the distribution of this variable.

S1.2 Independent variables

Political Trust. We created this variable out of a battery of questions measuring respondents' trust towards a list of actors and institutions. The wording of the overall instruction was as follows: 'please tell me on a score of 0-10 how much you personally

trust each of the institutions I read out. 0 means you do not trust an institution at all, and 10 means you have complete trust'. We then calculated this individual-level variable as the mean value of trust towards the country's parliament, political parties, and politicians.[i]

Political Efficacy. Respondents' answer to the survey question, 'How much would you say the political system in [country] allows people like you to have a say in what the government does?', with response options as 1 = 'not at all', 2 = 'very little', 3 = 'some', 4 = 'a lot', 5 = 'a great deal'.

Energy Dependence. Respondents' answer to the survey question, 'Overall, how confident are you that you could use less energy than you do now?', with response options (reverse coded) from 0 = 'completely confident' to 10 = 'not at all confident'.

Rural Areas. A variable based on respondents' deception of the area where they live, coded as 1 = 'a big city', 2 = 'the suburbs or outskirts of a big city', 3 = 'a town or a small city', 4 = 'a country village', 5 = 'a farm or home in the countryside'.

Individual-level controls

Age. A continuous variable based on the age of respondents. The acceptance of carbon taxes likely decreases with age (Thalmann, 2004).

[i]The other actors and institutions in the battery, which we did not include in the calculation of this variable, were the country's legal system and police as well as the European Parliament and the United Nations.

Education. An ordinal variable indicating the highest level of education that the respondents successfully completed: 1 'less than lower secondary' = 1, 'lower secondary' = 2, 'lower tier upper secondary' = 3, 'upper tier upper secondary' = 4, 'advanced vocational, sub-degree' = 5, 'lower tertiary education, BA level' = 6, or 'higher tertiary education, MA level or above' = 7. The acceptance of carbon taxes likely increases with education (Alberini, Ščasný, & Bigano, 2018; Hsu, Walters, & Purgas, 2008; Thalmann, 2004).

Female. A binary variable based on gender, coded as 1 for females and 0 for males.

Household Income. An ordinal variable based on the total income of the respondents' household, after tax and compulsory deductions. It ranges from 1 to 10, where 1 indicates the lowest decile of income and 10 the highest. The acceptance of carbon taxes likely increases with income (Gevrek & Uyduranoglu, 2015; Hsu et al., 2008; Kotchen, Turk, & Leiserowitz, 2017).

Left-Right Orientation. An ordinal variable measuring where the respondents would place themselves on a left-right scale, where 0 indicates the left and 10 indicates the right. The acceptance of carbon taxes is likely higher among the people on the left of the political spectrum (Hammar & Jagers, 2006; Thalmann, 2004).

Climate Worries. An ordinal variable measuring whether the respondents are are 'not at all worried' = 1, 'not very worried' = 2, 'somewhat worried' = 3, 'very worried' = 4, or 'extremely worried' about climate change. The acceptance of carbon taxes likely increases with the redistributional concerns for the environment (Alberini et al., 2018; Carattini, Baranzini, Thalmann, Varone, & Vöhringer, 2017; Gevrek & Uyduranoglu, 2015; Kotchen et al., 2017).

Cost Worries. An ordinal variable measuring whether the respondents are 'not at all worried' = 1, 'not very worried' = 2, 'somewhat worried' = 3, 'very worried' = 4, or 'extremely worried' that energy may be too expensive for many people in their country. The acceptance of carbon taxes likely decreases with the redistributional concerns for others (Brännlund & Persson, 2012; Carattini et al., 2017; Thalmann, 2004; Kallbekken & Sælen, 2011).

Country-level controls

GDP. Gross domestic product, calculated as the total US Dollar per capita in 2016 (OECD, 2018).

Party Position. The average position of political parties—in the European Union countries in 2014—with regard to the following statement: 'Renewable sources of energy (e.g. solar or wind energy) should be supported even if this means higher energy costs', with response categories as –1 = 'completely disagree', –0.5 = 'tend to disagree', 0 = 'neutral', 0.5 = 'tend to agree', and 1 = 'completely agree'. The data for this variable comes from an expert survey in the *euandi* project (Garzia, Trechsel, & De Sio, 2017).

Carbon Tax. A binary variable, coded as 1 for countries with carbon pricing initiatives, or otherwise as 0 (World Bank, 2018). The acceptance of carbon taxes is likely related to current tax situation in a country (Jagers & Hammar, 2009).

Renewable Capacity. Maximum net electric generating capacity through power plants and other installations that use renewable energy sources in 2016 (IRENA, 2018).

S2 Mean Levels of Support: Source Data

Figure 1 in the main text plots the mean levels of public support for taxes and subsidies to reduce climate change in each country. In this section, we provide the source data in Table S2.

S3 Complete Tables

For reasons of brevity and space, the regression tables in the main text report only a summary of the results. This section provides the complete version of Table 1 and Table 2.

Table S2: Mean levels of public support for policy options to reduce climate change.

			Taxes		Subsidies	
	Country	Sample	Mean	SD	Mean	SD
AT	Austria	2010	2.82	1.24	4.22	0.90
BE	Belgium	1766	2.72	1.23	3.91	1.05
CH	Switzerland	1525	3.22	1.18	4.13	0.89
CZ	Czech Republic	2269	2.62	1.27	3.48	1.30
DE	Germany	2852	3.00	1.14	4.14	0.93
EE	Estonia	2019	2.60	1.04	3.93	0.93
ES	Spain	1958	2.46	1.24	4.07	1.09
FI	Finland	1925	3.34	1.08	3.94	0.96
FR	France	2070	2.54	1.18	3.90	1.00
GB	United Kingdom	1959	2.95	1.18	3.75	1.05
HU	Hungary	1614	2.66	1.26	4.46	0.89
IE	Ireland	2757	2.70	1.28	3.70	1.17
IL	Israel	2557	2.60	1.23	3.77	1.21
IS	Iceland	880	3.17	1.16	3.66	0.98
IT	Italy	2626	2.58	1.24	3.87	1.09
LT	Lithuania	2122	2.69	1.28	3.81	1.00
NL	Netherlands	1681	2.93	1.24	4.23	0.90
NO	Norway	1545	3.16	1.23	4.21	0.86
PL	Poland	1694	2.34	1.03	3.99	0.96
PT	Portugal	1270	2.51	1.28	3.75	1.29
RU	Russian Federation	2430	2.64	1.10	3.57	1.06
SE	Sweden	1551	3.48	1.21	4.29	0.83
SI	Slovenia	1307	2.63	1.23	4.47	0.82
Total		44387	2.72	1.19	3.89	1.06

Notes: This table reports the means and standard deviations (SD) of public support for increasing taxes on fossil fuels and for subsidising renewable energy to reduce climate change, as plotted in Figure 1. All values based on ESS Round 8 (ESS, 2016), weighted to account for sampling error, non-response bias, and differences in inclusion probabilities. The total values are calculated with additional weights to account for the different population sizes of the countries in the dataset.

Table S3: Explaining the support for taxes relative to subsidies—complete results for Table 1.

	Taxes–Subsidies	
	Basic Model	+ Controls
Political Trust	0.05***	0.05***
	(0.00)	(0.00)
Political Efficacy	0.08***	0.08***
	(0.01)	(0.01)
Energy Dependence	–0.02***	–0.01***
	(0.00)	(0.00)
Rural Areas	–0.06***	–0.05***
	(0.01)	(0.01)
Age		0.00
		(0.00)
Education		0.01**
		(0.00)
Female		0.01
		(0.02)
Household Income		0.00**
		(0.00)
Left-Right Orientation		–0.01*
		(0.00)
Climate Worries		0.04***
		(0.01)
Cost Worries		–0.12***
		(0.01)
GDP		0.00
		(0.00)
Party Position		0.03
		(0.25)
Carbon Tax		0.10
		(0.14)
Renewable Capacity		0.00
		(0.00)
Constant	–1.29***	–1.60***
	(0.07)	(0.28)
N–Observations	40653	28477
N—Groups	23	18
Log likelihood	–70830.21	–49412.92
Wald χ^2	674.21	751.62

Notes: Models include multilevel OLS coefficients, where individuals are nested in countries, with standard errors in parentheses. The dependent variable is the difference between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change. Individual-level controls include age, gender, left-right orientation, climate change worries, and energy cost worries. Country-level controls include GDP, average party position on green energy, whether the countries have carbon taxes, and their renewable energy capacity. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table S4: Explaining the support for taxes and subsidies—complete results for Table 2.

	Taxes		Subsidies	
	Basic Model	+ Controls	Basic Model	+ Controls
Political Trust	0.07***	0.07***	0.02***	0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Political Efficacy	0.11***	0.08***	0.03***	–0.00
	(0.01)	(0.01)	(0.01)	(0.01)
Energy Dependence	–0.05***	–0.03***	–0.03***	–0.02***
	(0.00)	(0.00)	(0.00)	(0.00)
Rural Areas	–0.07***	–0.05***	–0.01**	0.00
	(0.00)	(0.01)	(0.00)	(0.00)
Age		–0.00***		–0.00***
		(0.00)		(0.00)
Education		0.05***		0.04***
		(0.00)		(0.00)
Female		0.04**		0.03**
		(0.01)		(0.01)
Household Income		0.00		–0.00***
		(0.00)		(0.00)
Left-Right Orientation		–0.04***		–0.03***
		(0.00)		(0.00)
Climate Worries		0.23***		0.19***
		(0.01)		(0.01)
Cost Worries		–0.14***		–0.02**
		(0.01)		(0.01)
GDP		0.00		–0.00
		(0.00)		(0.00)
Party Position		0.37**		0.33
		(0.14)		(0.19)
Carbon Tax		0.03		
		(0.08)		
Renewable Capacity				–0.00
				(0.00)
Constant	2.67***	2.07***	3.96***	3.65***
	(0.05)	(0.16)	(0.06)	(0.21)
N—Observations	40972	28616	41450	28846
N—Groups	23	18	23	18
Log likelihood	–64732.78	–44316.21	–60158.23	–40718.30
Wald χ^2	2121.56	3357.98	364.89	1601.01

Notes: Models include multilevel OLS coefficients, where individuals are nested in countries, with standard errors in parentheses. The dependent variables are the support for increasing taxes on fossil fuels (first two columns) or for subsidising renewable energy (last two columns) to reduce climate change. Individual-level controls include age, gender, left-right orientation, climate change worries, and energy cost worries. Country-level controls include GDP, average party position on green energy, whether the countries have carbon taxes (first two columns), and their renewable energy capacity (last two columns). ** $p < 0.01$, *** $p < 0.001$.

S4 Robustness Checks

S4.1 Ordered logistic regression models

In the main text, we treated various variables—most importantly, the dependent variables—as continuous although they are ordinal. In this section, we show that our substantive findings remain substantively the same if we treat them as ordinal instead. Table S5 and Table S6 present the results re-estimated in multilevel ordered logistic regression models.

Table S5: Multilevel ordinary logistic regression models—Robustness check for Table 1.

	Taxes–Subsidies			
	Basic Model		+ Controls	
	Coef.	Std.Error	Coef.	Std.Error
Political Trust	0.06***	0.00	0.06***	0.01
Political Efficacy	0.10***	0.01	0.10***	0.01
Energy Dependence	–0.03***	0.00	–0.02***	0.00
Rural Areas	–0.08***	0.01	–0.07***	0.01
Age			0.00	0.00
Education			0.02**	0.01
Female			0.02	0.02
Household Income			0.00***	0.00
Left-Right Orientation			–0.01*	0.01
Climate Worries			0.07***	0.01
Cost Worries			–0.18***	0.01
GDP			0.00	0.00
Party Position			0.02	0.32
Carbon Tax			0.13	0.17
Renewable Capacity			0.00	0.00
Cut-point 1	-2.58***	0.09	-2.20***	0.36
Cut-point 2	-1.37***	0.09	-0.97**	0.36
Cut-point 3	-0.33***	0.09	0.08	0.36
Cut-point 4	0.77***	0.09	1.23***	0.36
Cut-point 5	2.67***	0.09	3.12***	0.36
Cut-point 6	3.95***	0.10	4.37***	0.36
Cut-point 7	5.26***	0.11	5.67***	0.37
Cut-point 8	6.67***	0.15	7.06***	0.39
N—Observations	40653		28477	
N—Groups	23		18	
Log likelihood	–69102.42		–48256.72	
Wald χ^2	669.77		801.18	

Notes: Models include multilevel ordered logistic regression coefficients, where individual respondents are nested in countries, with standard errors in adjoining columns. The dependent variable is the difference between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table S6: Multilevel ordinary logistic regression models—Robustness check for Table 2.

	Taxes				Subsidies			
	Basic Model		+ Controls		Basic Model		+ Controls	
	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error	Coef.	Std.Error
Political Trust	0.11***	0.00	0.11***	0.01	0.02***	0.00	0.03***	0.01
Political Efficacy	0.18***	0.01	0.13***	0.01	0.06***	0.01	–0.01	0.01
Energy Dependence	–0.07***	0.00	–0.05***	0.00	–0.06***	0.00	–0.03***	0.00
Rural Areas	–0.11***	0.01	–0.07***	0.01	–0.03***	0.01	0.01	0.01
Age			–0.00***	0.00			–0.00***	0.00
Education			0.08***	0.01			0.09***	0.01
Female			0.06**	0.02			0.00	0.02
Household Income			0.00	0.00			–0.00***	0.00
Left-Right Orientation			–0.06***	0.01			–0.06***	0.01
Climate Worries			0.39***	0.01			0.40***	0.01
Cost Worries			–0.25***	0.01			–0.01	0.01
GDP			0.00	0.00			–0.00	0.00
Party Position			0.57*	0.22			0.66	0.41
Carbon Tax			0.07	0.12				
Renewable Capacity							–0.00	0.00
Cut-point 1	–1.36***	0.08	–0.50	0.26	–3.36***	0.12	–2.68***	0.44
Cut-point 2	–0.06	0.08	0.88***	0.26	–2.26***	0.12	–1.58***	0.44
Cut-point 3	0.96***	0.08	1.91***	0.26	–1.34***	0.11	–0.69	0.44
Cut-point 4	2.81***	0.08	3.88***	0.26	0.56***	0.11	1.34**	0.44
N—Observations	40972		28616		41450		28846	
N—Groups	23		18		23		18	
Log likelihood	–61262.24		–41795.47		–53163.95		–35356.62	
Wald χ^2	2103.80		3180.49		329.05		1693.75	

Notes: Models include multilevel ordered logistic regression coefficients, where individual respondents are nested in countries, with standard errors in adjoining columns. The dependent variable is the difference between the respondents' support for tax and subsidies to reduce climate change. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

S4.2 Models with ties removed

Figure 2 in the main text has a peak at value 0, meaning that the respondents with equal support for taxes and subsidies is the most common scenario. In this section, we remove these observations with 'no overall preference' from our data, and rerun the ordered logistic regression models again in Table S7. Despite removing almost half of our observations, it shows that the results remain substantively the same.

Table S7: Robustness check with ties removed.

	Taxes–Subsidies			
	Basic model		+ Controls	
	Coef.	Std.Error	Coef.	Std.Error
Political Trust	0.08***	0.01	0.07***	0.01
Political Efficacy	0.13***	0.01	0.13***	0.02
Energy Dependence	–0.03***	0.00	–0.02***	0.01
Rural Areas	–0.06***	0.01	–0.05***	0.01
Age			0.00	0.00
Education			0.02*	0.01
Female			0.06*	0.03
Household Income			0.00*	0.00
Left-Right Orientation			–0.01*	0.01
Climate Worries			0.07***	0.02
Cost Worries			–0.17***	0.01
GDP			0.00	0.00
Party Position			0.10	0.33
Carbon Tax			0.17	0.18
Renewable Capacity			0.00	0.00
Cut-point 1	–2.11***	(0.10)	–1.89***	(0.38)
Cut-point 2	–0.83***	(0.10)	–0.59	(0.38)
Cut-point 3	0.40***	(0.10)	0.65	(0.38)
Cut-point 4	2.43***	(0.10)	2.76***	(0.38)
Cut-point 5	3.75***	(0.10)	4.04***	(0.38)
Cut-point 6	5.06***	(0.11)	5.35***	(0.38)
Cut-point 7	6.48***	(0.16)	6.74***	(0.40)
N—Observations	29354		20991	
N—Groups	23		18	
Log likelihood	–45370.36		–32110.16	
Wald χ^2	610.85		627.22	

Notes: Models include multilevel ordered logistic regression coefficients, where individual respondents are nested in countries, with standard errors in adjoining columns. The dependent variable is the difference between the respondents' support for *increasing taxes for fossil fuels* and *subsidising renewable energy* to reduce climate change. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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